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Improving the Incidence of Postoperative Delirium in the Elderly: A Quality Improvement Project

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Improving the Incidence of Postoperative Delirium in the Elderly: A Quality Improvement Project

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ABSTRACT

Objective: This quality improvement (QI) project aimed to improve healthcare provider knowledge and attitude regarding exogenous Melatonin to decrease postoperative delirium in the elderly population and determine the effectiveness of an educational intervention.

Background: Postoperative delirium is prevalent in the elderly population. It is associated with increased healthcare costs, functional decline, prolonged hospital stays, and higher morbidity and mortality. The incidence of postoperative delirium in admitted hospitalized patients was projected to be 20% to 29% in geriatrics medicine patients and 11% to 51% in surgical patients. Evidence suggests the use of exogenous Melatonin can decrease the incidence and duration of postoperative delirium.

Methods: A 672-bed acute care hospital in South Florida has a large elderly population requiring anesthetic services. Anesthesia providers were educated on preventative measures to reduce the incidence of postoperative delirium in this facility and the recognition of risk factors increasing the incidence of postoperative delirium. A pretest survey was provided to assess anesthesia providers' knowledge and attitudes regarding using Melatonin versus Midazolam and postoperative delirium. An educational module included risk factors for developing postoperative delirium, medication classification, and literature findings on Melatonin and Midazolam. At the end of the presentation, a posttest survey containing the same questions as the pretest form was given to the same participants.

Results: After implementing the educational intervention, there was an increase in knowledge and attitudes regarding anesthesia providers in reducing the incidence of postoperative delirium. Most participants reported they were likely to implement Melatonin into their clinical practice.

Discussion: Postoperative delirium is associated with functional and cognitive decline, increased mortality, extended length of stay, and increased costs. Literature displays the benefits of using Melatonin for reducing postoperative delirium in elderly patients. After completing the educational intervention, there was an increased knowledge of Melatonin and its effect on reducing the incidence of postoperative delirium. Participants improved their attitudes and knowledge toward their role and preventative techniques for reducing postoperative delirium. The small sample size is a limitation of this project, as only eight participants completed the module.

Conclusion: An educational intervention can enhance provider knowledge, attitudes, and increase the use of exogenous Melatonin to reduce the incidence of postoperative delirium.

Keywords: Midazolam, Melatonin, elderly, postoperative delirium, postoperative cognitive dysfunction.

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INTRODUCTION

Delirium is a common issue in the acute care setting among elderly individuals. *Delirium* is an acute onset of impaired cognitive functions and disturbance in attention and awareness not due to pre-existing, established, or evolving neurocognitive disorder.[1] Postoperative delirium (POD) arises on postoperative days one through three, distinctly upon emergence from anesthesia. POD is due to immune activation, oxidative stress, and neurotransmitter imbalance. High operative stress surgeries (e.g., cardiac or hip) are associated with an increased risk of developing POD.

The incidence of POD is exceptionally variable; a review of 80 primary studies showed a range from 0% to 73.5% and an average of 36.8%.[2] The elderly is categorized as a high-risk group in developing POD and consequential diagnosis of dementia in the future. Unfortunate outcomes include persistent functional decline, prolonged hospital stay, higher morbidity and mortality, and increased healthcare costs.[1] An increase in POD is expected due to the global aging population. In the United States, POD costs are estimated at $38 to $150 billion annually.[3]

There is no specific pathophysiologic explanation identified in the development of POD. Five prominent theories are postulated to explain delirium development: neuronal aging, neuroinflammation, neurotransmitter imbalance, neuroendocrine activation, and network connectivity change. Patients who develop POD have increased levels of tumor necrosis factor-alpha (TNF-α), interleukin-6 (IL6), interleukin-8 (IL-8), interleukin-10 (IL-10), C-reactive protein, and proinflammatory/anti-inflammatory ratio (P/A). The production of TNF-α and IL-6 is the leading cause of cognitive impairment in POD, and this process can accelerate in the elderly. Inhibition of the Acetylcholine (Ach) muscarinic M1 receptor is linked to delirium-

related symptoms. Additionally, increased dopamine (DA) transmission also contributes to the development of delirium.[4] Elevated cortisol levels ensued in patients with POD.

PICO Clinical Question

In elderly patients, would the use of Melatonin versus Midazolam decrease postoperative delirium or cognitive dysfunction?

Problem Identification

Postoperative delirium (POD) is a significant health concern in the elderly. A single mechanism for delirium is not fully understood, nor will it clarify the development of POD. Multiple factors are identified as risk factors in developing POD, such as comorbidities, age greater than 70, history of falls, alcohol use, and cognitive or functional decline. Important triggering factors include polypharmacy, malnutrition, pain, use of urinary catheters, Intensive Care Unit (ICU) admission, length of hospital stay, blood loss, preoperative anemia, and type of surgery.[2] POD occurs approximately in 17% to 61% of major surgical procedures.[2] As a whole, delirium can significantly affect patient outcomes and healthcare costs.

Researchers discovered that elderly patients who were considered cognitively normal before admission and experienced delirium during their stay are more likely to be diagnosed with dementia within several years compared with those who did not experience delirium.[5] Evidence suggests implementing pharmacological and non-pharmacological interventions to prevent POD in the elderly. One study revealed the need to implement multidisciplinary interventions and collaboration between clinicians on pre- and postoperative care practices regarding pharmacological interventions to reduce and manage POD in older people more effectively.[3] This project aimed to determine the effectiveness of an educational session on provider

knowledge and attitudes toward using Melatonin versus intravenous Midazolam preoperatively to reduce the incidence of POD in elderly patients.

Background

The geriatric population continues to evolve and requires further surgical procedures. Unfortunate outcomes include functional decline, prolonged hospital stay, higher morbidity and mortality, and increased healthcare costs.[4] POD is a corollary of anesthetic emergence that typically arises on postoperative days 1 to 3. There are multiple risk factors for identifying patients at risk for POD. The advanced age of 70 years or older is well-recognized as a major risk factor for POD influencing postoperative comorbidities and recovery.[6] Additionally, POD involves other significant deficiencies apart from age.

Recognizing risk factors and prevention methods in the elderly is vital. To date, a cholinergic deficiency, with an excess of dopamine, and the inhibition of the neurotransmitter gamma-aminobutyric acid (GABA) are believed to impact the development of delirium.[7] Electroencephalogram findings demonstrated reduced functional connectivity in patients with POD.

Scope of the Problem

POD is associated with adverse outcomes such as prolonged recovery, frailty, decreased functional capacity, increased healthcare costs, and surgical complications. Delirium also causes postoperative depression and long-term consequences for delayed cognitive recovery. The incidence of postoperative delirium in hospitalized are projected to be 20% to 29% in geriatric medicine patients and 11% to 51% in surgical patients.[8] Additionally, approximately 56% of hospitalized patients with dementia will develop delirium.[8]

Consequences of the Problem

POD is one of the most captivating complications and rising costs in the healthcare system. Consequences of POD include an association with a higher morbidity and mortality rate in the surgical setting. Extrapolated data estimated inpatient hospital costs of an episode of postoperative delirium as $20,327, yearly cumulative costs as $44,291, and total costs to our healthcare system of delirium episodes in the Medicare population are $32.9 billion.[9] Recent 2021 studies indicate rising costs in the treatment of POD. Prevention is vital in decreasing healthcare costs while providing safe, quality care for elderly patients.

Knowledge Gaps

Anesthesia providers need evidence-based guidelines for creating a safe anesthetic plan. Unfortunately, research, interpretation, and clinical translation barriers limit providers' understanding of delirium in the preoperative period and hinder the anesthesiologist's ability to apply focused interventions to affected patients.[10] In the year 2050, the geriatric population is estimated to reach 1.6 billion.[10] Therefore, it is imperative to improve geriatric postoperative outcomes.

There needs to be a concise treatment for preventing POD since it is a complex multifactorial pathogenesis. Multiple risk factors for delirium vary by individual, comorbidity, and type of surgery. Studies have demonstrated that drinking more than 3 times per week, intraoperative measurement of lactic acid greater than 2 mmol/L, preoperative diabetes, intraoperative application of Bispectral Index (BIS), ASA greater than II, and VAS greater than 2 were independent factors for the occurrence of POD.[11] Existing guides with identification and management strategies for mitigating delirium throughout the preoperative period are available.

There are no direct preoperative medications to use or avoid in the elderly. However, numerous studies have indicated specific medications and polypharmacy associated with the development of delirium. The utilization of benzodiazepines in the elderly will increase the likelihood of developing POD. On the contrary, Melatonin is hypothesized to be a safe treatment option. *Melatonin* is the principal substance secreted by the pineal gland, and the synthesis and release of Melatonin are stimulated by darkness and inhibited by light. Exogenous Melatonin benefits include regulation of circadian rhythm, improved sleep and mood, anxiolysis, anti-inflammatory, analgesic, and oncostatic.

Proposal Solution

There is no current "gold standard" for the prevention of POD. Although there are no standardized guidelines, it is possible to minimize the incidence of POD through provider knowledge enhancement on its pathogenesis, risk factors, and management. The most effective strategies for reducing POD are to enhance knowledge on identifying risk factors and management. The first step is to increase knowledge among providers in identifying risk factors and proper prescreening. This quality improvement (QI) project aimed to present an educational session on the advantages of using Melatonin versus Midazolam preoperatively to reduce the incidence of POD. The goal was to enhance provider knowledge in identifying risk factors preoperatively and compare the usage of Melatonin versus Midazolam to reduce the incidence of POD in the elderly.

LITERATURE SYNTHESIS

Evidence Search

A systematic search of literature was conducted via electronic search using the following PICO(T): In the elderly, how does an educational session on provider knowledge and attitude in

administering Melatonin compared to Midazolam preoperatively affect in reducing the incidence of postoperative delirium? The literature search included the following databases Cumulative Index to Nursing and Allied Health Literature (CINAHL), PubMed, and Cochrane Library. Studies were limited to Randomized controlled trails and systematic reviews from 2011 through 2022. The engine search included a combination of the following keywords "midazolam," "postoperative delirium," "melatonin and postoperative delirium," "perioperative melatonin," "preoperative," "prevention of postoperative delirium," "delirium," "elderly," and "postoperative." The filter criteria for inclusion were as follows: publication within 10 years, systematic reviews (SR), randomized controlled trials (RCT), meta-analysis (MA), full-text, peer-reviewed articles, and articles in the English language. The final selection of articles met criteria and alignment with the PICO(T) question for evidence synthesis.

Exogenous Melatonin Compared to Placebo

Two randomized controlled trials (RCTs) utilized Melatonin before surgery and consecutively postoperative compared to the administration of a placebo for evaluating delirium.[12,13] The dosing administered varied among both studies. Participants received 0.5 mg of Melatonin or a placebo every night for 14 days or until discharge in one RCT.[13] To evaluate results, the occurrence of delirium was determined using the Confusion Assessment Method (CAM). The results revealed that exogenous low-dose Melatonin administered nightly to elderly patients effectively decreased the risk of delirium. The second RCT participants, undergoing coronary artery bypass grafting or valve replacement surgery, received 7 days of treatment with Melatonin 3 mg at night or placebo, starting 2 days before the surgery.[14] The primary outcome was the incident of delirium within 7 days of surgery assessed via the daily clinical assessment Confusion Assessment Method (CAM).

A triple-blinded, randomized, placebo-controlled trial evaluated the occurrence of delirium in the Intensive Care Unit (ICU). It examined whether using Ramelteon, a Melatonin agonist, can prevent delirium and shorten the ICU stay of critically-ill patients. The intervention group received Ramelteon 8mg, and the control group received a placebo, lactose powder, at 20:00 hours every day until discharge from the ICU.[15] The occurrence of delirium was assessed using the CAM-ICU method every 4 hours. The occurrence rate of delirium was 24.4% in the Ramelteon group and 46.5% in the placebo group, where the difference between the two groups was statistically significant.[15] Also, the Ralmetron receivers had a shorter length of stay in the ICU.

Hosseini Kasnavieh et al[16] measured the incidence of delirium in the elderly undergoing open-heart surgery. The intervention group received 3mg of Melatonin and evaluated using the CAM tool on the day of surgery compared to 3 days after. The incidence of delirium significantly reduced in the Melatonin control group, 35.7% and 5.7% on the day of operation, 68.6% and 31.4% three days after the operation.[16] Additionally, the administration of Melatonin improved sleep. Artemiou et al[17] implemented a prospective single-center observational non-randomized study on preventing postoperative delirium in cardiac surgery patients after receiving Melatonin treatment. Two groups were formulated: group A,250 consecutive patients with various cardiac surgery types, were analyzed, and group B,250 consecutive patients who received prophylactic preoperative Melatonin and had various types of cardiac surgery. The participants received 5 mg of Melatonin the evening before the operation, and the treatment continued until postoperative day 3. Delirium developed in 20.8% of patients from group A and 8.4% of patients from group B, with the difference in the incidence of delirium between the groups being statistically significant.[18] Findings suggest prophylactic treatment with exogenous

Melatonin in every patient scheduled for cardiac surgery. The administration of exogenous Melatonin significantly decreased the incidence of postoperative delirium after cardiac surgery.

Midazolam and Postoperative Delirium

One RCT trial compared the effects of cranial electrotherapy stimulation (CES) and Midazolam as a preoperative treatment in geriatric patients.[18] Participants between ages 65 and 79 received 0.7mg/kg of Midazolam preoperatively 30 minutes before general anesthesia. Patients exhibited less anxiety with CES than with Midazolam while maintaining higher oxygen saturations preoperatively and intraoperatively.

Li et al[19] conducted an RCT to analyze the effects of Midazolam sedation on Postoperative cognitive dysfunction (POCD) in elderly patients who underwent hip or knee replacement under spinal anesthesia. The Bispectral Index monitor (BIS) was used for the trial and kept between 70 and 85. Additionally, participants and controls completed a battery of 5 neuropsychological tests before and 7 days after surgery. The study revealed the incidence of POCD was 18.2%, 40.0%, and 51.9% in the Propofol, Dexmedetomidine, and Midazolam groups, respectively.[19] Also, Midazolam sedation led to a higher incidence of POCD than dexmedetomidine and propofol 7 days after surgery.

Preoperative Midazolam

Two Cohort studies revealed the correlation between Midazolam and the development of delirium.[20,21] The setting of the studies implemented varied. Zaal et al[20] evaluated the association between administering a benzodiazepine and ICU delirium. Among 1112 patients, benzodiazepine administration in an awake patient without delirium was associated with an increased risk of delirium the next day with 5mg of Midazolam.[20] Researchers also discovered that the incidence of delirium significantly increases when given continuously versus

intermittently. Stuff et al[21] conducted a study in a high-volume cancer center with participants who underwent radical prostatectomies. Participants were administered 7.5mg of oral Midazolam 30-60 minutes preoperatively and evaluated using the CAM-ICU in the postoperative care unit (PACU). Of 214 patients who received Midazolam, 49.1% tested positive for delirium at any point during the PACU stay.[21] Conversely, in the non-midazolam cohort, 33.0% showed delirium signs in the PACU.[21]

Critically Ill Patients and Midazolam

A single-center prospective RCT investigated the influence of analgesic-based Midazolam sedation on delirium and outcomes in critically ill patients and analyzed the risk factors of delirium.[22] Liu et al[22] divided mechanically ventilated patients into three medication groups: remifentanil, fentanyl, and the control group received only Midazolam. Data regarding the relationship between benzodiazepine and delirium is consistent. In this study, the patients who received Midazolam sedation without analgesics had a rate of delirium as great as 57.1%.[22]

Discussion

Melatonin has demonstrated benefits in restoring normal circadian function, which may be an essential factor in preventing postoperative cognitive dysfunction (POCD). Based on the literature review, there was sufficient evidence suggesting using exogenous Melatonin preoperatively to improve sleep and decrease the incidence of POD. An optimal Melatonin dose for decreasing the incidence of POD has yet been identified. Despite standardized Melatonin dosing, all studies demonstrated a reduction in POD development. Melatonin administration is correlated with a significant reduction in the incidence of delirium in cardiac patients.[16,17] Additional benefits of Melatonin include improved sleep and a decreased length of stay in the

ICU.[12,15] Melatonin was superior to Midazolam in decreasing postoperative delirium in elderly adults.

Li et al[19] discovered that Midazolam sedation led to a higher incidence of POCD than dexmedetomidine and propofol 7 days after surgery. Stuff et al[21] mentioned a significant reduction in PACU delirium without the administration of sedative premedication. These findings are consistent to suggest that using Midazolam preoperatively increases the incidence of POD.

In one RCT, there was no statistical significance in recommending prophylactic Melatonin for elderly patients undergoing major cardiac surgery.[14] The dosing for both Melatonin and Midazolam varied among all studies. Future studies on evaluating the effects of Melatonin and Midazolam postoperatively on elderly patients in various procedures are recommended for a definitive conclusion. Additionally, future studies to further evaluate the effects of co-morbidities and medication usage when assessing the role of Melatonin in improving cognitive dysfunction are recommended.

Conclusion

Overall, Melatonin was given preoperatively, and the continuation postoperatively effectively reduced POD or delirium. Midazolam given preoperatively was associated with a higher incidence of developing POD. Elderly patients undergoing cardiac surgery benefitted from using Melatonin to reduce POD diagnosed by the CAM, CAM-ICU, or Mini-Mental State Examination (MMSE).

ORGANIZATIONAL ASSESSMENT

Goals and Outcomes

This QI project aimed to measure anesthesia provider knowledge on the use of Melatonin to decrease postoperative delirium in the elderly population. The target population was approximately 10 healthcare anesthesia providers working within the acute-care facility in Miami, Florida. The SMART acronym was utilized to guide the development of the project goals; SMART signifies specific, measurable, achievable, realistic, and timely objectives.

Specific

Anesthesia providers received evidence-based recommendations for improving the incidence of postoperative delirium in the elderly population using exogenous Melatonin. The purpose of this intervention was to increase anesthesia providers' awareness of preoperative medications and their effects on postoperative delirium in the elderly, as well as the benefits of implementing Melatonin in the preoperative setting.

Measurable

The effectiveness of knowledge enhancement was analyzed through a questionnaire provided to all participants before and after receiving an educational intervention. The outcomes were measured by evaluating enhanced knowledge and attitudes of anesthesia providers on defining postoperative delirium and its consequences, the mechanism of action and effects of Melatonin and Midazolam, and the impact of both medications on postoperative delirium. Qualtrics software was utilized to create the pre and post-surveys.

Achievable

Anesthesia providers, including anesthesiologists and certified registered nurse anesthetists (CRNA), received enhanced knowledge on postoperative delirium.

Realistic

Anesthesia providers were educated on methods for improving postoperative delirium for the elderly through an educational voiceover module that is readily available through invitation.

Timely

The educational module was completed and available to anesthesia providers within a 2-month time frame. Within 2 months, anesthesia providers had access to the Qualtrics survey, which included the educational module for improving the incidence of postoperative delirium in the elderly.

Program Structure

A SWOT analysis was conducted to help capture the project's strengths, weaknesses, opportunities, and threats. The SWOT effectively presented critical issues that may arise while implementing the project on utilizing Melatonin preoperatively in the elderly to reduce the incidence of postoperative delirium. A crucial strength was that skilled healthcare professionals can understand new evidence-based techniques for improving patient outcomes and have the willingness to participate. The weaknesses noted include the possible lack of knowledge of the mechanism of action for Melatonin and its benefits. These weaknesses result in opportunities for further educating and enhancing provider knowledge on methods for reducing the incidence of postoperative delirium. The provider's resistance to using Melatonin preoperatively was a threat to the implementation.

Theoretical Framework

Lewin’s theory of change model framed this quality improvement (QI) project. Lewin’s analysis model consists of a framework for understanding the change process within a system or health initiative. Lewin’s theory of change model consists of three processes: unfreezing,

moving, and refreezing, a proposed model for implementing long-lasting change.[23] Unfreezing is the need and prepares members to move to an improved level of practice.[23] The educational module presented to the anesthesia providers exemplifies the unfreezing stage. The module emphasized the incidence, consequences, and preventative measures. The movement phase involves the driving forces for adopting change. The comparison of Melatonin and Midazolam through a literature review serve as the driving forces to facilitate change. Restraining forces that can pose barriers to the desired change include individual perspectives and beliefs toward change in practice. To enhance change, motivation to improve the quality of patient care is essential. During the final stage, anesthesia providers acquired enhanced knowledge from the educational module and adopted it into clinical practice. According to Lewin's theory, improvements must be refrozen to maintain the desired change.[23]

Definition of Terms

Postoperative cognitive dysfunction is a subtle disorder of thought process that impairs memory, cognition, and prognosis and quality of life. Older patients are vulnerable to memory disturbances and other types of cognitive impairment after surgical operations.[19] POCD causes a slow onset of cognitive impairments compared to POD, which is more acute.

The Confusion Assessment Method (CAM) and CAM-ICU were used in the studies to evaluate the development of delirium. Three domains of cognitive function are measured: orientation, short-term memory, and attention. *Mini-Mental State Exam (MMSE)* is a 30-point cognitive screening tool to measure cognitive impairment or changes over time. It does not indicate an official diagnosis but may indicate the presence of cognitive impairment. The MMSE has a pooled sensitivity of 88% and a specificity of 86%.[12] The MMSE may still have value in tracking cognitive change in POCD patients.[12]

Setting

The setting for this project is a 672-bed acute-care hospital in Miami, Florida. This facility is a private, independent, not-for-profit teaching hospital with multiple specialties. Certified registered nurse anesthetists (CRNAs) and anesthesiologists provide anesthesia services in 26 operating rooms and satellite areas within the hospital. Florida has one of the highest elderly populations at 21%. According to the 2023 Census statistics, 16.9% of the residents of Miami are 65 or older.[24] However, patients from all over South Florida receive services at this facility. Anesthesia providers must be aware of the unique considerations for the elderly, including increased incidence of postoperative delirium and techniques to reduce the incidence. Prior to recruiting providers, approval was obtained by Florida International University and the acute care hospital. For this QI project, the target populations were CRNAs and anesthesiologists. A letter of participation was sent out by e-mail to the anesthesia providers in this facility. The sample included male and female anesthesia providers, full-time, part-time, per-diem employees, and diverse ages and ethnic groups. Exclusion criteria included student registered nurse anesthetists because this QI project is focused on enhancing anesthesia providers' knowledge and clinical practice. Participants completed the pretest and posttest.

Intervention

This scholarly project included multiple stages, such as enrolling participants, completing the pretest, delivering an educational presentation, and completing the posttest. Once enrolled, the pretest was administered to assess their current knowledge of postoperative delirium and preventative measures. After the pretest, participants completed an educational presentation that defined postoperative delirium and its consequences, the mechanism of action and effects of Melatonin and Midazolam, and the impact of both medications on postoperative delirium and

demonstrate current findings from a comprehensive literature review. The comprehensive literature review supported the validity of the content provided in the educational presentation. To conclude, all anesthesia providers completed a posttest to evaluate enhanced knowledge and determine if the evidence provided is practical for integration into clinical practice.

Procedure

An e-mail was sent with an invitation to participate in the project and distributed to CRNAs and anesthesiologists in the acute hospital setting. The e-mail included a link to participate in the pretest utilizing the Qualtrics survey platform before receiving the educational module. The survey did not include or capture personal information and was anonymous throughout the project. Once the pretest was completed, the educational module was distributed virtually. Finally, the posttest survey link was provided to the participants through e-mail after completing the educational module.

Protection of Human Subjects

During the QI project, no personally identifiable information was captured through the pretest and posttest surveys. Privacy in identifiers were maintained throughout the project to ensure the data's safety and security. Institutional Review Board (IRB) approval was obtained by following the guidelines before the intervention from Florida International University and hospital in South Florida. Participants were informed of their right to stop the intervention at any time.

Analysis

The collected data was processed through Excel software to enter survey responses through a password-protected laptop. A pretest and posttest Qualtrics survey was conducted and collected. Measures included enhanced knowledge and attitudes after the educational module

intervention. Statistical analysis was conducted to evaluate participants' responses based on the pretest and posttest survey results for the efficacy of the educational module and its implication for clinical practice.

Measure

The survey incorporated items related to the providers' knowledge, attitudes, and implementation strategies. Item questions included knowledge on postoperative delirium in the elderly, Melatonin and Midazolam pharmacology, and the benefits versus the side effects. The questionnaire also incorporated anesthesia providers' attitudes on the clinical concern and implications for practice change. Relevant demographic information such as age, ethnicity, and gender are used to compare groups. The posttest incorporated the same questionnaire as the pretest.

IMPLEMENTATION RESULTS

Demographics

More females (*n* = 7, 87.5%) then males (*n* = 1, 12.5%) participated in the quality improvement project. Participants ethnicities varied: Caucasian (*n* = 1, 14.29 %), Hispanic (*n* = 3, 42.86%), African American (*n* = 2, 28.57 %), other (*n* = 1, 14.29%), and 1 participant did not disclose. CRNAs were the only participants in this quality improvement project (*n* = 8, 100%). CRNAs' years of experience ranged: 0-2 years (*n* = 2, 25%), 2-5 years (*n* = 2, 25%), 5-10 years (*n* = 2, 25%), and over 10 years (*n* = 2, 25%). All of the participants received a master's degree (*n* = 2, 25%) or doctorate degree (*n* = 6, 75%) in level of education.

Attitudes

Table 1 indicates the participants' pretest and posttest responses towards attitudes about Melatonin versus Midazolam and postoperative delirium in the elderly. Most participants (*n* = 4,

50%) disagreed on the importance of using anesthetics to reduce the incidence of postoperative delirium in the pretest. The remaining participants agreed on the correlation between postoperative delirium and using anesthetic techniques (*n* = 3, 37.50%). Only one participant strongly agree in the pretest on anesthetic techniques and postoperative delirium (*n* = 1, 12.50%). Most participants (*n* = 5, 62.50%) strongly agreed on the importance of using proper anesthetic techniques to reduce the incidence of postoperative delirium. The remainder of the participants disagreed with the statement (*n* = 3, 37.50%). There were mixed responses in the pretest stating the level of agreement for choosing a clinical anesthetic technique in decreasing the adverse outcomes of postoperative delirium in the elderly population: strongly disagree (*n* = 1, 12.50%), disagree (*n* = 1, 12.50%), neutral (*n* = 2, 25%), agree (*n* = 1, 12.50%), and strongly agreed (*n* = 3, 37.50%). There was a statistical significance in the posttest for the level of agreement: strongly agree (*n* = 5, 62.50%), agree (*n* = 2, 25%), and neutral (*n* = 1, 12.50%).

Table 1. Comparisons in Pretest and Posttest Attitudes

Questions	Pretest	Posttest
Please indicate your level of agreement with the following statement: As an anesthesia provider, your clinical anesthetic technique can assist in decreasing the negative outcomes of postoperative delirium in the elderly population.	Strongly agree 37.5% Agree 37.5% Neutral 0% Disagree 12.5% Strongly disagree 12.5%	Strongly agree 62.5% Agree 25% Neutral 12.50% Disagree 0% Strongly disagree 0%
Please indicate your level of agreement with the following statement: It is important to use anesthetic techniques to reduce the incidence of	Strongly agree 37.5% Agree 12.5% Neutral 25%	Strongly agree 62.5% Agree 0% Neutral 12.5%

postoperative delirium in the elderly.	Disagree 12.5% Strongly disagree 12.5%	Disagree 12.5% Strongly disagree 12.5%

Knowledge

Seven survey questions tested the participants' knowledge regarding Melatonin, Midazolam, and postoperative delirium. Table 2 shows the participants' knowledge in the pretest and posttest. There was a significant increase in knowledge enhancement on postoperative delirium identification. Most participants improved in knowledge regarding the incidence of postoperative delirium in the elderly (62.5 %). There was an enhanced improvement in knowledge regarding the causes of postoperative delirium in the elderly (75%), consequences of postoperative delirium (71.43%), and identification of postoperative delirium (100%). There was a slight improvement in the posttest results and Melatonin pharmacology (80%), mechanism of action, and benefits of Melatonin (80%). There was no change in the posttest results regarding Midazolam and the incidence of postoperative delirium in the elderly (75%).

Table 2. Comparisons in Pretest and Posttest Knowledge

Questions	**Pretest**	**Posttest**
Postoperative delirium arises upon emergence and through postoperative days one to three?	87.50%	100%
Which of the following is NOT a consequence of	50%	71.43%

postoperative delirium?		
Elderly patients undergoing high stress surgeries are at the highest risk of developing postoperative delirium.	50%	62.50%
Benefits of Melatonin include which of the following?	62.50%	80%
Melatonin is secreted by the pineal gland and high levels closely resembles:	62.50%	80%
The use of Midazolam in advance age has been linked to:	75%	75%
Postoperative delirium is thought to be caused by oxidative stress, immune activation, and neurotransmitter imbalance?	50%	75%

Implementation

In the pretest, only 5 participants indicated the likelihood of using Melatonin as part of their anesthetic technique in the elderly (*n* = 5, 62.5%). These findings indicated the need for knowledge enhancement on Melatonin and its benefits in the elderly to reduce postoperative delirium. Table 3 shows the pretest and posttest responses regarding using Melatonin in current practice for reducing postoperative delirium in the elderly. Before the educational intervention, only 1 participant reported using Melatonin (*n* = 1, 12.5%). The remaining participants reported never using Melatonin as part of their technique (*n* = 7, 87.5%). After completing the educational module, most participants (*n* = 5, 62.5%) indicated they would likely implement it into clinical practice. The remaining participants (*n* = 3, 37.5%) indicated they are neither and unlikely to implement it into their practice. These findings suggest that participants are willing to use Melatonin to reduce the incidence of postoperative delirium in the elderly after receiving the educational module.

Table 3. Implementation Pretest and Posttest Difference

Question	Pretest	Posttest
How likely are you to utilize Melatonin in your practice?	Extremely likely 12.5% Somewhat likely 50% Neither likely nor unlikely 12.5% Somewhat unlikely 0% Extremely unlikely 12.5%	Extremely likely 25% Somewhat likely 37.5% Neither likely nor unlikely 25% Somewhat unlikely 12.5% Extremely unlikely 0%

DISCUSSION

Limitations

Forty participants who belong to the anesthesia group received the distribution survey via e-mail. However, only 8 people participated and completed the entire module. A small sample size is a limitation of this project. The survey could be distributed to more participants within

multiple acute hospital systems to increase the sample size. Also, 1 participant opened the survey but never completed the entire module. The incomplete response could have impacted the final results.

Implications for Anesthesia Practice

Postoperative delirium is a relevant issue in the elderly population. Postoperative delirium is s associated with functional and cognitive decline, increased mortality, extended length of stay, and increased costs. There are limited choices anesthetists can use to decrease postoperative delirium in the elderly intraoperatively. However, the literature demonstrates the benefits and statistical significance of using Melatonin and reducing postoperative delirium with inpatient patients continuing exogenous Melatonin throughout their hospital stay.

After completing the educational intervention, the quality improvement project demonstrated an increased knowledge of Melatonin and its effect on reducing the incidence of postoperative delirium. Participants improved their attitudes towards their role and preventative techniques or strategies for preventing postoperative delirium. After completing the educational intervention, participants reported implementing Melatonin for elderly patients to prevent postoperative delirium. Results suggest that participants will modify their anesthetic plan by adding Melatonin to improve postoperative outcomes in the elderly.

CONCLUSION

Postoperative delirium is a significant health concern in the elderly. Postoperative delirium occurs in 17% to 61 % of the elderly undergoing surgery.[8] The development is multifactorial: multiple comorbidities, age greater than 70, history of falls, alcohol use, and cognitive or functional decline. Unfortunately, poor outcomes are identified as a burden to our healthcare system: increased healthcare costs, increased length of stay, functional decline, and

higher mortality rates. Due to the increasing aging population, anesthesia providers must become aware of anesthetic considerations, including preventing postoperative delirium. Preventative measures and knowledge of methods can reduce the incidence of postoperative delirium. The educational module on Melatonin versus Midazolam and postoperative delirium can enhance a provider's knowledge, increase their attitudes and increase the implementation of exogenous Melatonin in the elderly population for improving quality care and improve patient outcomes. Important triggering factors include polypharmacy, malnutrition, pain, use of urinary catheters, Intensive Care Unit (ICU) admission, length of hospital stay, blood loss, preoperative anemia, and type of surgery.

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APPENDICES

Appendix A: Literature Review

Author	Design/ Method	Sample/ Setting	Major Variables Studied and their Definitions	Measure-ment and Data Analysis	Findings	Results	Conclusions	Limitations
Fan et al, 2017[12]	Prospective cohort study. RCT The study aimed to investigate if exogenous Melatonin could ameliorate early postoperative cognitive decline (POCD) in elderly patients undergoing hip arthroplasty with spinal anesthesia.	Setting: Department of Anesthesio-logy, Jinling Hospital, Nanjing University, Nanjing, China. Patients: 139 patients with ASA I–III, older than 65 years old (mean age: 74.5 ± 5.5; gender: male 53 and female 86), scheduled for hip arthroplasty.	Independent Variable (1 mg of Melatonin) Dependent Variable (POCD) Mini-Mental State Examination (MMSE) score, subjective sleep quality, general well–being, postoperativ e fatigue, and visual analogue scale for pain were evaluated	Statistical analysis performed utilizing the SPSS 16.0 software. Data was tested using the Kolmogrov –Smirnov test.	Patients in the control group had a significant decrease on days 1, 3, and 5 after surgery ($F = 3.595$, $p < 0.05$) when compared with their preoperativ e value and decreased significant-ly ($p < 0.05$) when compared with the Melatonin group	The MMSE score in the control group decreas-ed signify-cantly after surgery compar-ed to the Melaton-in group on days 1, 3, and 5. On the contrary, the MMSE score in	Preoperative exogenous Melatonin can improve early POCD, suggesting the restoration of normal circadian function with good sleep quality may be one of the critical factors in preventing or treating POCD.	The authors recommend future studies further to evaluate the effects of co-morbidities and medication usage when assessing the role of Melatonin in improving cognitive dysfunction.

		Patients received 1 mg oral melatonin or placebo daily 1 h before bedtime one day before surgery and for another 5 consecutive days postoperatively.	pre–operatively and on days 1, 3, 5, and 7 after surgery.		value for the corres-ponding date. There was a significant post-operative impairment of subjective sleep quality ($F = 7.95$, $p < 0.05$), general well–being ($F = 5.791$, $p < 0.05$), and fatigue ($F = 8.333$, $p < 0.05$) was found in the control group when compared with the Melatonin group.	the Melaton-in group remained un-changed during the 7 days of monitor-ing.	
Al-Aama et al, 2011[13]	Randomized, double-blinded,	Setting: An internal medicine	Independent Variable (0.5 mg of	Data were collected on	Out of 145 individuals 72 were	Exogenous low- dose Melatonin	This study had several strengths,

	placebo-controlled study. The purpose was to evaluate the efficacy of low-dose exogenous Melatonin in decreasing delirium.	service in a tertiary care centre in London, Ontario, Canada. Participants: 145 individuals aged 65 years or over were admitted through the emergency department to a medical unit in a tertiary care hospital. Intervention: Participants received 0.5 mg of Melatonin or placebo every night for 14 days or until discharge.	Melatonin of rapid dissolving Melatonin Dependent Variable: Delirium The primary outcome was the occurrence of delirium determined by using the Confusion Assessment Method (CAM).	standard-ized forms and entered SPSS, v. 16. Fisher's exact tests were used to compare categorical variables and indepen-dent *t*-tests (unequal variances) were used for continuous variables.	randomly assigned to the Melatonin group and 73 to the placebo group. The Melatonin was associated with a lower risk of delirium (12.0% vs. 31.0%, P 0.014), with an odds ratio (OR), adjusted for dementia and co-morbidities of 0.19 (95% confidence intervals (CI): 0.06–0.62).	administered nightly to elderly patients effectively decreased the risk of delirium.	including that it was randomized, double-blinded, and placebo-controlled. Both groups were well balanced. Also, another strength mentioned is the regular assessment of patients for delirium with standardized, validated instruments. Limitations mentioned in the study include its small sample size, preventing an examination of the effects of specific medication classes on delirium. Also, complete data collection was not feasible for some

								participants, and some were lost during the follow up process-for the Melatonin group. Authors stated that future research is required to confirm the potential protective role of Melatonin in more extensive studies and different populations, such as surgical, critically ill, or long-term care patients
Ford et al, 2020[14]	Randomized double-blind placebo-controlled clinical trial. The purpose of the study was to determine if Melatonin	Setting: The trial occurred in two metropolitan hospitals in Perth, Western Australia Participants: 210 adults	IV: 3mg Of Melatonin DV: Incidence of Delirium The primary outcome was the incident of delirium	Statistical software Stata v.13.1 was used to manage and analyze the data. Descriptive statistics were used	Forty-two participants developed delirium, but was evenly distributed between the groups (melatonin 21/98,	The groups did not differ in terms of length of stay, mood, anxiety, and cognitive	This randomized double-blind placebo-controlled trial does not support the prophylactic use of Melatonin to prevent	

	use reduces the incidence of delirium in individuals undergoing major cardiac surgery.	aged 50 years or older undergoing coronary artery bypass grafting or valve replacement surgery. Intervention: Participants were randomly assigned to 7 days of treatment with Melatonin 3 mg at night or placebo, starting 2 days before the surgery.	within 7 days of surgery assessed via daily clinical assessment Confusion Assessment Method (CAM). Secondary outcomes were to assess the duration and severity of delirium, length of hospital stay, cognitive function, and mood and anxiety symptoms at discharge and 3 months after the surgery.	to summarize data by treatment allocation. A *t*-test was used to compare the differences between the groups.	21.4%; placebo 21/104, 20.2%; adjusted odds ratio [OR] = .78; 95% confidence interval [CI] = .35-1.75). The median duration of delirium was 3 interquartile range [IQR] = 2-4) and 2 (IQR = 1-3) days for people treated with Melatonin and placebo, respectively (z = −1.03; *p* = .304).	performance.	delirium after major cardiac surgery.

					A similar proportion of participants experien-ced severe episodes of delirium in each group (Melatonin 9/21, 42.9% vs placebo 6/21, 28.6%; $\chi 2$ = .93; p = .334; adjusted OR = 1.98; 95% CI = .40-9.78).			
Nishikimi et al, 2018[15]	A single-center, triple-blinded, randomized placebo-controlled trial The objective was to evaluate the occurrence of delirium in the ICU and examine	Setting: ICU of an academic hospital Patients: ICU criteria who would take oral medications or via a nasogastric tube during the first 48	DV: Ramelteon 8 mg IV: Prevention of Delirium A total of 88 subjects were randomized to the ramelteon group (45	Student *t*-test for continuous variables along with a Fisher exact test for categorical variables (occurrence of delirium and mortality at discharge)	The occurrence rate of delirium was 24.4% (11/45) in the ramelteon group and 46.5% (20/43) in the placebo group, the difference between	Accord-ing to authors, findings included a decrease in the duration of ICU stay (4.56 d) in the ramel-teon	Ramelteon decreased the duration of ICU stay and the occurrence rate and duration of delirium were statistically significantly.	In this study, the prophylactic administration of ramelteon, a selective melatonin receptor agonist, was associated with a reduction occurrence and duration of delirium in the ICU.

	whether using ramelteon, a Melatonin agonist, can prevent delirium and shorten the ICU stay of critically ill patients.	hours of admission. Interventions: The intervention group received ramelteon (8mg/d), and the control group received a placebo (1g/d of lactose powder) at 20:00 hours every day until discharge from the ICU.	subjects) or the placebo group (43 subjects).	Delirium was assessed every 4 hours using the Confusion Assessment Method (CAM).	the two groups being statistically significant (p = 0.044; odds ratio, 2.69 [1.09–6.65]). Additionally, the duration of delirium was significantly shorter in the ramelteon group as compared to that in the placebo group (0.78 vs 1.40 d; p = 0.048).	group compared with the placebo group (5.86 d) (p = 0.082 and p = 0.028 before and after adjustments).		Ramelteon demonstrated a six-fold and three-fold higher affinity for melatonin receptor 1 and receptor 2. Limitations included family visitation and sample size. Authors mentioned that they did not assess the type of delirium whether hyperactive, hypoactive, or mixed type delirium.
Hosseini Kasnavieh et al, 2019[16]	Double blind randomized controlled clinical trial. This study aimed to evaluate the incidence of delirium in	140 participants who underwent coronary artery bypass	IV: Control group received 3 mg Melatonin DV: Presence of delirium on the day of	Data were analyzed by Chi-square, *t*-test, paired *t*-test, and Cochran tests.	The incidence of delirium in the Melatonin control group was 35.7% and 5.7% on the day of	Results showed a signify-cant differ-ence in the frequen-cy of	Melatonin has a beneficial effect on preventing and treating delirium by improving sleep. According to the authors,	Limitations included that the study was not performed in patients with a high risk of developing delirium, such as those over 70 years old or

	the elderly undergoing open heart surgery.		surgery and three days after by the Confusion Assessment Method for ICU (CUM-ICU).		operation, 68.6% and 31.4% three days after the operation, respective-ly.	cognitive tests of CAM-ICU on the day of surgery and 3 days after surgery between the 2 groups ($p <$ 0.001).	results demonstrated in conjunction with non-pharmacolo-gical interventions can reduce the incidence of delirium and the complications of this neuro-psychiatric syndrome. Hence, the administration of Melatonin is correlated with a significant reduction in the incidence of delirium after heart surgery.	with previous cognitive impairments. Also, the study was limited due to the measurement of the CAM assessment alone and the implementation in one center. The authors recommend further studies on the effects of other effective drugs on treating delirium, such as antipsychotics and receptor blockers.
Artemiou et al, 2015[17]	Prospective single center observational non-randomized study. The purpose was to study the effect of	Setting: Tertiary level care facility Participants: The first group (group A), the control group,	IV: 5 mg of Melatonin was given the evening before the operation, and the treatment was	Data was analyzed using the chi-square analyses or Fisher's exact test.	Delirium developed in 52 (20.8%) patients from group A and 21 (8.4%) patients	The administ ration of exo-genous Mela-tonin signify-cantly	Findings suggested prophylactic treatment with exogenous Melatonin in every patient scheduled for	One strength concluded for this study was that there are limited studies examining the role of exogenous Melatonin in

	melatonin treatment in preventing postoperative delirium in cardiac surgery patients.	included 250 consecutive patients with various cardiac surgery types. The second group (group B) included 250 consecutive patients who received prophylactic perioperative Melatonin treatment and had various types of cardiac surgery.	continued until post-operative day 3. DV: Post-operative delirium in cardiac surgery patients		from group B, with the difference in the incidence of delirium between the groups being statistically significant (p = 0.001).	decreas-ed the inci-dence of post-operative delirium after cardiac surgery.	cardiac surgery.	preventing postoperative delirium in a group of patients after cardiac surgery. Limitations to the study were that it is a prospective observational study, no baseline psychiatric and cognitive screening tests were performed, and the CAM-ICU assessment was only conducted on cardiac ICU patients.
Park et al, 2022[18]	A randomized controlled trial This study compared the effects of cranial electrotherap	Eighty patients, ages 65 to 79 years, undergoing general anesthesia. Midazolam pre-	IV: pre-medicated Midazolam was given to one group (n = 40) and CES pretreatment group (n = 40)	Data analysis used was the SPSS software version 25.0 for Windows	In the pre-operative holding area, the anxiety score (p = .02) and the sedation score (p <		CES pretreatment relieved preoperative anxiety with less risk of over-sedation and respiratory depression	The limitation of the study is that anxiety may vary depending on the types of surgery and diagnosis. For more accuracy, the

	y stimulation (CES) and midazolam as a preoperative treatment in geriatric patients.	medication group (M group, *n* = 40) or CES pretreatment group (CES group, *n* = 40). The patients in the M group were intramuscularly injected with midazolam (0.07 mg/kg) 30 minutes before receiving general anesthesia. The patients in the CES group received 20 minutes of CES pretreatment on the day before and on the morning of the surgery.	. DV: preoperative treatment in geriatric patients.	Demographic data were analyzed using the Mann-Whitney U test, the independent *t*-test, or the chi-square test.	.001) were significantly lower in the CES group compared with those in the Midazolam group. The oxygen saturations in the preoperative holding area and the operating room were significantly higher in the CES group than in the Midazolam group ($p <$ .001).		than midazolam premedication in geriatric patients.	study was conducted on patients undergoing the same surgery with the same diagnosis.
Li et al, 2019[19]	Prospective randomized	Participants: 164 patients	IV: Participants	Comparisons were	Overall, 60 of 164	The incidence of	Among all three	Limitations included that

,	controlled preliminary trial. This study analyzed the effects of dexmedet-omidine, propofol, or midazolam sedation on POCD in elderly patients who underwent hip or knee replacement under spinal anesthesia.	aged 65 years or older who underwent hip or knee arthroplasty at China-Japan Friendship Hospital ,and 41 nonsurgical controls were included in this study. The light was used with the (bispectral index [BIS] monitor and kept between 70 and 85). All participants and controls completed a battery of 5 neuro-psychological tests before and 7 days after surgery. One year post-operatively, the patients	received dexmedetom idine, propofol or midazolam with the combination of neuraxial anesthesia for hip or knee replacement. DV: POCD	made using unpaired *t*-tests for continuous variables, or Kruskal-Wallis test for ranked data, and the x 2 or Fisher exact test for dicho-tomous variables. Tests were performed using SAS 9.2	patients (36.6%) were diagnosed with POCD 7 days postoperati vely, POCD incidence in propofol group was significant-ly lower than that in dexmedeto midine and midazolam groups (18.2% vs. 40.0%, 51.9%, x2=6.342 and 13.603.	POCD was 18.2%, 40.0%, and 51.9% in the propofol, dex-medeto-midine, and mida-zolam groups, respect-ively. These results suggest that propofol has the least impact on cognitive function 1 week after the opera-tion, while mida-zolam tended to	medications given (dexmedetomi dine, propofol, and midazolam), propofol sedation shows a significant advantage in term of short-term POCD incidence. They also found that midazolam sedation led to a higher incidence of POCD than dexmedetomid ine and propofol 7 days after surgery.	this study was conducted at a single institution on a homogeneous group of patients. However, the study was designed to maximize the reliability of the neurocognitive and functional test results and limit confounders.

		and controls were interviewed over the telephone using the Montreal cognitive assessment 5-minute protocol.				impair cognitive function in patients.	
Zaal et al, 2015[20]	This cohort study aimed to evaluate the association between benzodiazepine and ICU delirium occurrence.	Adults were admitted for at least 24 hours to the 32-bed mixed-ICU of the University Medical Center Utrechta. An institutional protocol was placed throughout the study period that targeted level of sedation, daily sedation interruption, and assessment of	IV: Benzodiazepine 5mg DV: ICU Delirium	Markov model, multi-nomial logistic regression analysis was used. SPSS 20 was used to perform the statistical statistics.	Among 1112 patients, 9867 daily transitions occurred. Benzodiazepine administration in an awake patient without delirium was associated with an increased risk of delirium the next day [OR 1.04 (per 5 mg of midazolam	According to the findings, a daily dose of 5 mg of Midazolam administered to a patient who is both coma and delirium-free will increase the odds that this patient will develop delirium the next day by 4%.	The study had several potential limitations. The study was conducted at a single-center; patients were routinely evaluated for delirium when maximally awake; some of the delirium detected in the cohort may have been rapidly reversible, and potentially not clinically relevant.

	all patients for delirium at least twice daily using the CAM-ICU.	equivalent administer-ed) 95 % CI 1.02–1.05). When the method of benzodiaze pine administra-tion was incorpor-ated into the model, the odds of transition-ing to delirium was higher with benzodia-zepines given continuous -ly (OR 1.04, 95 % CI 1.03–1.06) compared to benzodiaze pines given intermittent ly (OR 0.97, 95 %	

					CI 0.88–1.05).			
Stuff et al, 2022[21]	Secondary analysis of prospectively cohort studies collected data before (midazolam cohort) and after (non-midazolam cohort).	Setting was conducted in a high-volume prostate cancer center in Hamburg, Germany. Throughout the study period, approximate-ly 2,500 radical prostatectomies were performed annually. Criteria: patients were scheduled for elective radical prostatectomy either by open retropubic or robot-assisted technique for treatment of prostate cancer and if	IV: 7.5mg oral midazolam 30-60 minute preoperatively DV: PACU delirium	Demo-graphic and clinical characteri-stics as well as the incidence of PACU delirium in the historical and the new midazolam policy were compared with Mann-Whitney U-tests, $\chi 2$ tests, or Fisher's exact tests, as appropriate. CAM-ICU positivity at different time points was compared with $\chi 2$ tests or Fisher's exact tests	PACU delirium rates were 49% in the midazolam cohort (n = 214) and 33% in the non-midazolam cohort (n = 218). This difference was not statistically significant on multi-variable logistic regression analysis (OR 0.847 [95% CI 0.164; 4.367]; P = 0.842). Age (OR 1.102 [95% CI 1.050; 1.156]; P < 0.001), the cumulative dose of sufentanil	Of 214 patients, who had received mida-zolam, 105 (49.1%) tested positive for delirium at any one time point during the PACU stay. In the non-mida-zolam cohort 72/ 218 patients (33.0%) showed delirium signs in the PACU. The inci-dence of delirium	According to authors, the incidence of PACU delirium was significantly lower in patients under the new policy without sedative premedication. However, increased age, sufentanil, and TIVA for anesthesia maintenance were significantly associated with PACU delirium.	Limitations were a possible under-estimation of the incidence of PACU delirium. Screening instruments that are more suitable for the PACU environment have been developed after patients had been enrolled in this study. The secondary analysis of prospectively collected data before and after implementation of a restrictive benzodiazepine policy was neither randomized nor blinded. This study was only conducted on patients

	they were fluent in German in order to undergo psychometric assessments, and age over 60.	and Bonferroni corrected for multiple comparison. SPSS Statistics 24 (IBM Deutschland GmbH) was used for statistical analyses.	(OR 1.014 [95% CI 1.005; 1.024]; P = 0.005), and propofol-sufentanil for anesthesia maintenance (OR 2.805 [95% CI 1.497; 5.256]; P = 0.001) were significantly associated with PACU delirium.	was highest at 15 min follow-ing extuba-tion and decreas-ed during the PACU stay in both groups. At 30 min, 45 min, and 60 min, signify-cantly more patients in the mida-zolam cohort were screened positive for PACU delirium compar-ed with	undergoing prostatectomy.

						patients, who had not received mida-zolam for premed-ication.		
Liu et al, 2017[22]	Single center, prospective randomized controlled trial. The aim of this study was to investigate the influence of analgesic based midazolam sedation on delirium and outcomes in critically ill patients and to analyze the risk factors of delirium.	Setting: A surgical intensive care unit (ICU) in a tertiary care hospital in China. Patients selected had to be mechanically ventilated that required sedatives. Patients admitted to the surgical intensive care unit who required sedation and were undergoing mechanical ventilation	IV: 3 divided groups. DV: Influence of Delirium	The differences between multiple samples were compared using 1-way analysis of variance (ANOVA), and the differences between 2 samples were compared using an indepen-dent samples *t*-test or a Mann-Whitney U-test. Categorical	A total of 105 patients were enrolled, and 35 patients were included in each group. Compared to the control group, patients who received remifent-anil and fentanyl required less midazolam each day ($p = 0.038$ and		Data regarding the relationship between benzodiaz-epine and delirium is consistent. In this study, the patients who received midazolam sedation without analgesics had a rate of delirium as great as 57.1%.	Limitations included: All patients received midazolam; therefore, the results cannot be applied to other sedatives, such as propofol or dexmedetomidi ne. The study was solely conducted in the surgical ICU. Additionally, it is a single center trial with a small sample; the results deserve further confirmation in trials at multiple

	for longer than 24 hours were randomly divided into three groups: 1) the remifentanil group received remifentanil and midazolam, 2) the fentanyl group received fentanyl and midazolam, and 3) the control group received only midazolam.	variables are presented as the number of patients (percent-age), and data were compared using a chi-square test or Fisher's exact test.	<0.001, respectivel y). Remifen-tanil has a significant effect on reducing the occurrence of delirium (p = 0.007). The logistic regression analysis of delirium demonstrat ed that remifentani l (OR 0.230, 95%Cl 0.074–0.711, p = 0.011) is indepen-dent protective factors for delirium, and high APACHE II score (OR 1.103, 95%Cl		centers with a large sample.

		1.007–1.208, p = 0.036) is the indepen-dent risk factor for delirium.

Appendix B: FIU IRB Approval

FIU Research & Economic Development
FLORIDA INTERNATIONAL UNIVERSITY

MEMORANDUM

To: Dr. Yasmine Campbell

CC: Yalysher Acevedo

From: Carrie Bassols, BA, IRB Coordinator CeB

Date: March 3, 2023

Proposal Title: "Improving the incidence of Postoperative Delirium in the Elderly: A Quality Improvement Project"

The Florida International University Office of Research Integrity has reviewed your research study for the use of human subjects and deemed it Exempt via the **Exempt Review** process.

IRB Protocol Exemption #: IRB-23-0086 **IRB Exemption Date:** 03/03/23
TOPAZ Reference #: 112747

As a requirement of IRB Exemption you are required to:

1) Submit an IRB Exempt Amendment Form for all proposed additions or changes in the procedures involving human subjects. All additions and changes must be reviewed and approved prior to implementation.
2) Promptly submit an IRB Exempt Event Report Form for every serious or unusual or unanticipated adverse event, problems with the rights or welfare of the human subjects, and/or deviations from the approved protocol.
1) Submit an IRB Exempt Project Completion Report Form when the study is finished or discontinued.

Special Conditions: N/A

For further information, you may visit the IRB website at http://research.fiu.edu/irb.

Appendix C: Miami Beach Anesthesiology Associates IRB approval

Miami Beach Anesthesiology Associates, Inc.

Mount Sinai Medical Center • Division of Anesthesia

S. Howard Wittels MD Chairman
Hector Davila MSS, MD Executive Director
Guillermo Garcia MD Vice Chairman
Rick Hasty MD
Sebastian Baquero MD
Christopher Bauer MD
Vicente Behrens MD
Jayanand D'Mello MD Research Coordinator
Laura Foster MD
Pablo Fumero MD
Pedro Garcia MD
Howard Goldman MD Obstetrics Chief
Jason Hoyos DO Residency Program Co-Assistant Director
Flor Marin MD
Gerald Rosen MD Residency Program Director
Jason Wigley MD Residency Program Co-Assistant Director
Alexander Volsky MD
Jennifer Wright MD
J.P. Mato DNP, CRNA CRNA Director & SRNA Coordinator
Paula Schultz DNP, CRNA OB-Chief CRNA

March 7, 2023

Dr. Jorge Valdes, DNP, CRNA, APRN, FAANA
Chair, Associate Professor Department of Nurse Anesthesiology Florida International University

Re: IRB Waivers for Quality Improvement Projects with Miami Beach Anesthesiology Associates

The following students have proposed some interdepartmental education modules. These quality improvement projects are internal projects belonging to Miami Beach Anesthesiology Associates. Internal review board approval is not necessary for our departmental improvement projects per Mount Sinai Medical Center's advocate, Yvonne Ortiz.

The projects will involve surveying anesthesia providers from Miami Beach Anesthesiology Associates at Mount Sinai Medical Center of Florida.

Then **educational modules** performed by the students will be included a pre-test, ZOOM recorded educational module with a post-test lasting less than 20 minutes.

The following projects have been proposed and approved by our educational department and deem these projects IRB exempt.

Disposable Laryngeal Electrodes for Intraoperative Neuromonitoring: An Educational Module- **Mercado-Hernandez, David**

Implementation of a Formal Preceptor Teaching Tool in the Clinical Setting to Promote a Learner-Centered Teaching Environment- **Lyndi Bailey**

Improving the incidence of Postoperative Delirium in the Elderly: A Quality Improvement Project- **Acevedo, Yalysher**

Assessment & Anesthetic Management of Patients with Vaping History: An Evidence-Based Educational Module-**Perez Mirabal, David**

Immunomodulation Effects of Propofol versus Sevoflurane based Anesthesia on Deadly Cancers: A quality improvement educational project- **Tatiana Amaya Rivera**

Advantages of intravenous administration of remimazolam over midazolam in inflammatory bowel disease patients undergoing endoscopic procedures: an educational module- **Alexis Perez**

Dexmedetomidine as an Adjuvant for Spinal Anesthesia in Adult Parturients Undergoing Cesarean Section: An Evidence-Based Educational Module-**Kueser, Kathleen**

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Appendix D: Letter of Support

Miami Beach Anesthesiology Associates, Inc.

Mount Sinai Medical Center • Division of Anesthesia

February 7, 2023

Yasmine Campbell, DNP, CRNA, APRN, CNE
Clinical Assistant Professor
Department of Nurse Anesthesiology
Florida International University

Dr. Yasmine Campbell,

Thank you for inviting Miami Beach Anesthesiology Associates to participate in the Doctor of Nursing Practice (DNP) project conducted by Yalysher Acevedo entitled "Improving the incidence of Postoperative Delirium in the Elderly" in the Nicole Wertheim College of Nursing and Health Sciences, Department of Nurse Anesthesiology at Florida International University. I have granted the student permission to conduct the project using our providers.

Evidence-based practice's primary aim is to yield the best outcomes for patients by selecting interventions supported by the evidence. This proposed quality improvement project seeks to utilize the latest literature to increase providers awareness on preoperative medications and their effects on postoperative delirium in the elderly, as well the benefits of implementing Melatonin in the preoperative setting.

We understand that participation in the study is voluntary and carries no overt risk. All Anesthesiology providers are free to participate or withdraw from the study at any time. The educational intervention will be conveyed by a 15-minute virtual PowerPoint presentation, with a pretest and posttest questionnaire delivered by a URL link electronically via Qualtrics, an online survey product. Responses to pretest and posttest surveys are not linked to any participant. The collected information is reported as an aggregate, and there is no monetary compensation for participation. All collected material will be kept confidential, stored in a password encrypted digital cloud, and only be accessible to the investigators of this study: Yalysher Acevedo and Dr. Yasmine Campbell.

Once the Institutional Review Board's approval is achieved, this scholarly project's execution will occur over two weeks. Yalysher Acevedo will behave professionally, follow standards of care, and not impede hospital performance. We support the participation of our Anesthesiology providers in this project and look forward to working with you.

Respectfully,

Jampierre (J.P.) Mato, DNP, CRNA, APRN
Executive CRNA Director
SRNA Coordinator/Supervisor
Electronic Mail: Jampierre@bellsouth.net
Mobile Phone: 954-668-6080

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Appendix E: Informed Consent

CONSENT TO PARTICIPATE IN A QUALITY IMPROVEMENT PROJECT

IMPROVING THE INCIDENCE OF POSTOPERATIVE DELIRIUM IN THE ELDERLY: A QUALITY IMPROVEMENT PROJECT

SUMMARY INFORMATION
Things you should know about this study:

- **Purpose:** Educational module to increase providers awareness on preoperative medications and their effects on postoperative delirium in the elderly, as well the benefits of implementing Melatonin in the preoperative setting.
- **Procedures**: If the participant chooses to participate, they will be asked to complete a pretest, watch a voice PowerPoint, and then a post test
- **Duration:** This will take about a total of 20 minutes total.
- **Risks**: There will be minimal risks involved with this project, as would be expected in any type of educational intervention, which may include mild emotional stress or mild physical discomfort from sitting on a chair for an extended period.
- **Benefits:** The main benefit to you from this research is increase the participants knowledge on Melatonin on preventing postoperative delirium.
- **Alternatives:** There are no known alternatives available to the participant other than not taking part in this quality improvement project.
- **Participation:** Taking part in this quality improvement project is voluntary.

Please carefully read the entire document before agreeing to participate.

NUMBER OF STUDY PARTICIPANTS:
If the participant decides to be in this study, they will be one of ten people in this research study.

PURPOSE OF THE PROJECT
The participant is being asked to be in a quality improvement project. The goal of this project is to increase providers' knowledge on medication strategies to help improve the incidence of postoperative delirium in the elderly. The expectancy of this intervention is to increase

awareness of anesthesia providers on preoperative medications and their effects on postoperative delirium in the elderly, as well the benefits of implementing Melatonin in the preoperative setting. If you decide to participate, you will be 1 of approximately 10 participants.

DURATION OF THE PROJECT
The participation will require about 20 minutes of your time.

PROCEDURES
If the participant agrees to be in the project, PI will ask you to do the following things:

1. Complete an online 10 question pre-test survey via Qualtrics, an Online survey product for which the URL link is provided
2. Review the educational PowerPoint Module lasting 10 minutes via Qualtrics, an Online survey product for which the URL link is provided.
3. Complete the online 10 question post-test survey via Qualtrics, an Online survey product for which the URL link is provided.

RISKS AND/OR DISCOMFORTS
The main risk or discomfort from this research is minimal. There will be minimal risks involved with this project, as would be expected in any type of educational intervention, which may include mild emotional stress or mild physical discomfort from sitting on a chair for an extended period.

BENEFITS
The following benefits may be associated with participation in this project: An increased participants knowledge on the benefits of using Melatonin versus Midazolam in the preoperative setting for reducing postoperative delirium. The overall objective of the program is to increase the providers' knowledge based on the current literature.

ALTERNATIVES
There are no known alternatives available to the participant other than not taking part in this project. However, if the participant would like to receive the educational material, it will be provided to them at no cost.

CONFIDENTIALITY
The records of this project will be kept private and will be protected to the fullest extent provided by law. If, in any sort of report, PI might publish, it will not include any information that will make it possible to identify the participant. Records will be stored securely, and only the project team will have access to the records.

PARTICIPATION: Taking part in this quality improvement project is voluntary.

COMPENSATION & COSTS
There is no cost or payment to the participant for receiving the health education and/or for participating in this project.

RIGHT TO DECLINE OR WITHDRAW

The participation in this project is voluntary. The participant is free to participate in the project or withdraw the consent at any time during the project. The participant's withdrawal or lack of participation will not affect any benefits to which you are otherwise entitled. The investigator reserves the right to remove the participant without their consent at such time that they feel it is in their best interest.

RESEARCHER CONTACT INFORMATION

If you have any questions about the purpose, procedures, or any other issues relating to this research project, you may contact Yalysher Acevedo at (786) 971-8311 / Yacev005@fiu.edu or Dr. Yasmine Campbell at ycampbel@fiu.edu.

IRB CONTACT INFORMATION

If the participant would like to talk with someone about their rights pertaining to being a subject in this project or about ethical issues with this project, the participant may contact the FIU Office of Research Integrity by phone at 305-348-2494 or by email at ori@fiu.edu.

PARTICIPANT AGREEMENT

I have read the information in this consent form and agree to participate in this study. I have had a chance to ask any questions I have about this study, and they have been answered for me. By clicking on the "consent to participate" button below I am providing my informed consent.

Appendix F: Recruitment Letter

FIU Department of Nurse Anesthesiology

Nicole Wertheim College of Nursing & Health Sciences

Improving the incidence of Postoperative Delirium in the Elderly: A Quality Improvement Project

Dear Miami Beach Anesthesiology Association Providers:

My name is Yalysher Acevedo, and I am a student from the Anesthesiology Nursing Program Department of Nurse Anesthesiology at Florida International University. I am writing to invite you to participate in my quality improvement project. The goal of this project is to increase health care providers' awareness on preoperative medications and their effects on postoperative delirium in the elderly, as well the benefits of implementing Melatonin in the preoperative setting. You are eligible to take part in this project because you are a part of the Mount Sinai perioperative provider.

If you decide to participate in this project, you will be asked to complete and sign a consent form for participation. Next, you will complete a pre-test questionnaire, which is expected to take approximately 5 minutes. You will then be asked to view an approximately 10 minutes long educational presentation online. After going through the educational module, you will be asked to complete the post-test questionnaire, which is expected to take approximately 5 minutes. No compensation will be provided.

Remember, this is completely voluntary. You can choose to be in the study or not. If you'd like to participate or have any questions about the study, please email or contact me at 786-971-8311 or yacev005@fiu.edu.

Thank you very much.

Sincerely,

Yalysher Acevedo, DNP, ANCC-BC, MSN

Appendix G: Educational Module

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FIU

Improving the incidence of Postoperative Delirium in the Elderly: A Quality Improvement Project

Yalysher Acevedo, DNP, APRN, ANCC-BC
Yasmine Campbell, DNP, CRNA, APRN, CNE

FIU

LEARNING GOALS

From this quality improvement project, you will:

- Define postoperative delirium
- Understand the correlation of Midazolam and postoperative delirium
- Understand the impact that Melatonin has on postoperative delirium
- Impart findings from literature review that discuss the effects of Melatonin on postoperative delirium

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Background: Postoperative Delirium

Delirium is an acute onset of impaired cognitive functions and disturbance in attention and awarenessthat is not correlated to a pre-existing neurocognitive disorder.

Postoperative delirium (POD) upon emergence and through postoperative days one through three.

It is thought to be caused by oxidative stress, immune activation, and neurotransmitter imbalance.

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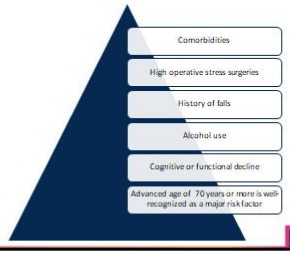
FIU

Risk Factors for Postoperative Delirium



FIU

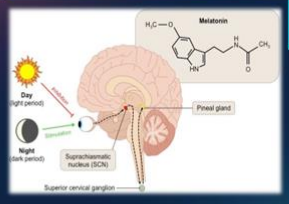
Consequences of Post-operative Delirium

- Increased Morbidity and Mortality
- Functional and cognitive impairment
- Extended hospital length of stay
- Increased healthcare costs
  - In the United States, costs are estimated to be $38- $150 billion annually.[1]
- An inpatient hospital costs of an episode of postoperative delirium is estimated to as $20,327, yearly cumulative costs $44, 291, and total costs to our healthcare system of delirium episodes in the Medicare population are $32.9 billion.[2]

FIU

Melatonin

- Melatonin (N-acetyl-5-methoxytryptamine) is the principal substance secreted by the pineal gland.
- Synthesis and release of melatonin are stimulated by darkness and inhibited by light.
- As melatonin increases, the hormone enters the bloodstream through passive diffusion.[3]
- It is metabolized primarily in the liver and excreted via urine.



Exogenous Melatonin

- Intravenous Melatonin is rapidly distributed, and the elimination half-time is 0.5 to 5.6 minutes.
- However, the bioavailability of oral Melatonin varies. Oral doses (1 to 5 mg) peak within one hour, followed by a decline to baseline values in four to eight hours. Low oral doses (0.1 to 0.3 mg) given in the daytime result in peak serum concentrations that are within the normal night-time range.[5]

Dose-dependent physiologic effects of Melatonin benefits include:

FIU

Findings from Literature Review: Melatonin and Postoperative Delirium

In two Randomized Control Trials, Melatonin was given before surgery and consecutively postoperative compared to the administration of a placebo for evaluating delirium.[5]

Results:

- Exogenous low-dose Melatonin administered nightly to elderly patients effectively decreased the risk of delirium.
- ➢ Ramelteon, a melatonin agonist, shorten ICU stays of critically-ill patients.
  - The occurrence rate of delirium was 24.4% in the Ramelteon group and 46.5% in the placebo group, where the difference between the two groups was statistically significant.[6]

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Findings from Literature Review: Melatonin and Postoperative Delirium

FIU

- An intervention group received Melatonin 3mg and evaluated using the Confusion Assessment Method tool on the day of surgery compared to 3 days after.
  - In elderly patients elderly undergoing open-heart surgery, the incidence of delirium significantly reduced in the Melatonin control group, 35.7% and 5.7% on the day of operation, 68.6% and 31.4% three days after the operation.[7]
- Two groups , undergoing cardiac surgery, received a placebo versus 5mg of Melatonin. The participants received 5 mg of Melatonin the evening before the operation, and the treatment continued until postoperative day 3.
  - Delirium developed in 20.8% of patients from group A and 8.4% of patients from group B, with the difference in the incidence of delirium between the groups being statistically significant.[8]

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Findings from Literature Review: Midazolam and Post-operative Delirium

Among 1112 patients, benzodiazepine administration in an awake patient without delirium was associated with an increased risk of delirium the next day with 5mg of Midazolam.[9]

7.5mg of oral Midazolam was administered 30-60 minutes preoperatively and evaluated using the CAM-ICU in the postoperative care unit (PACU).

- Of 214 patients, 49.1% tested positive for delirium during the PACU. [10]

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Proposed Intervention

No current "gold standard" for the prevention

↓

Enhance provider knowledge in identifying risk factors preoperatively

↓

Compare usage of Melatonin versus Midazolam in reducing the incidence of postoperative delirium

FIU

FIU

Summary

- Melatonin has demonstrated benefits in restoring normal circadian function, which may be an essential factor in preventing postoperative cognitive dysfunction.
- An optimal Melatonin dose for decreasing the incidence of POD has yet been identified.
- Despite standardized Melatonin dosing, all studies demonstrated a reduction in POD development.
- Additional benefits of Melatonin include improved sleep and a decreased length of stay in the ICU.[11]
- Midazolam sedation led to a higher incidence of POCD 7 days after surgery.[12]

FIU

Conclusion

- Future studies on evaluating the effects of Melatonin and Midazolam post-operatively on elderly patients in various procedures are recommended for a definitive conclusion.
- Additionally, future studies to further evaluate the effects of co-morbidities and medication usage when assessing the role of Melatonin in improving cognitive dysfunction are recommended.

FIU

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Appendix H: Demographics, Pretest and Post-test Questionnaire

Pretest and Posttest Questionnaire:

Improving the incidence of Postoperative Delirium in the Elderly: A Quality Improvement Project

INTRODUCTION

The primary aim of this QI project is to increase providers awareness of postoperative delirium in the elderly and the benefits of Melatonin for decreasing postoperative delirium.

Please answer the question below to the best of your ability. The questions are either in multiple choice or true/false format and are meant to measure knowledge on Melatonin in reducing the incidence on postoperative delirium.

PERSONAL INFORMATION

1. **Gender:** Male Female Other_____
2. **Ages 25 and above: _____**
3. **Ethnicity:** Hispanic Caucasian African American Asian Other_____
4. **Position/Title:** CRNA Anesthesiologist Resident Anesthesiologist Assistant
5. **Level of Education:** Certificate Bachelors Masters DNP PhD
6. **How many years have you been a perioperative provider?**

   Over 10 5-10 years 2-5 years 1-2 years

QUESTIONNAIRE

1. **Postoperative delirium arises upon emergence and through postoperative days one to three?** True or False

2. **Which of the following is NOT a consequence of postoperative delirium?**

   a. Functional and cognitive impairment
   b. Decreased healthcare costs
   c. Increased length of stay
   d. Increased morbidity and mortality

3. **Elderly patients undergoing high stress surgeries are at the highest risk of developing postoperative delirium.**

   a. Strongly agree
   b. Agree
   c. Neutral
   d. Disagree
   e. Strongly Disagree

4. **Benefits of Melatonin include which of the following?**

   a. Regulation of circadian rhythm
   b. Improved sleep and mood
   c. Anti-inflammatory properties
   d. All the above

5. **Melatonin is secreted by the pineal gland and high levels closely resembles:**

   a. Wakefulness
   b. Habitual Sleep
   c. Anxiety
   d. Delirium

6. **The use of Midazolam in advance age has been linked to:**

   a. Anxiety
   b. Seizures
   c. Increased incidence of postoperative delirium
   d. Decreased incidence of postoperative delirium

7. **Postoperative delirium is thought to be caused by oxidative stress, immune activation, and neurotransmitter imbalance?** True or False

8. **Please indicate your level of agreement with the following statement: It is important to use anesthetic techniques to reduce the incidence of postoperative delirium in the elderly.**

   a. Strongly agree
   b. Agree
   c. Neutral
   d. Disagree
   e. Strongly Disagree

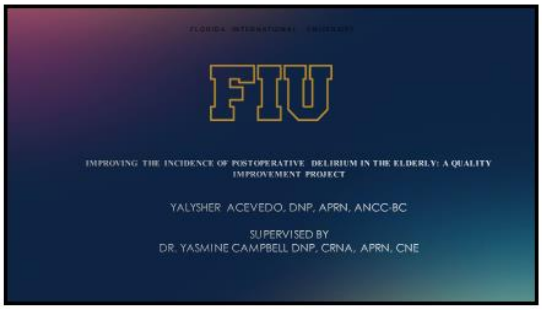
9. **How likely are you to utilize Melatonin in your practice?**

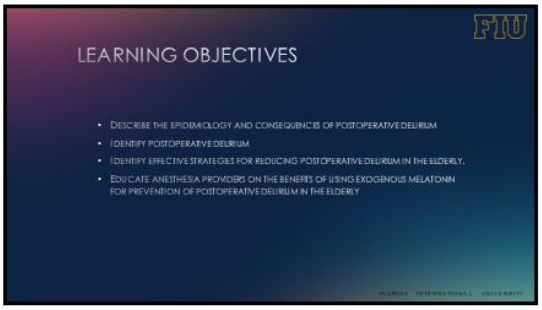
   1. Extremely likely
   2. Somewhat likely
   3. Neither likely nor unlikely
   4. Somewhat unlikely
   5. Extremely unlikely

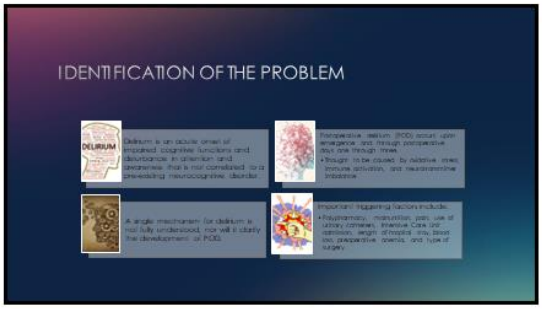
10. **As an anesthesia provider, your clinical anesthetic technique can assist in decreasing the negative outcomes of postoperative delirium in the elderly population.**

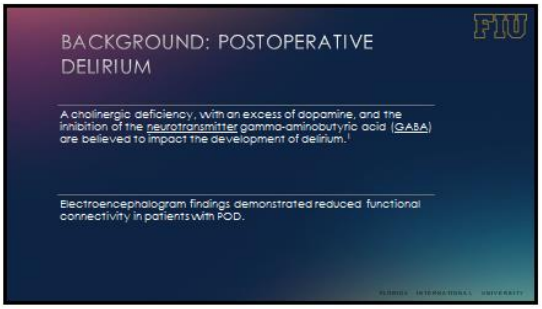
    1. Extremely likely
    2. Somewhat likely
    3. Neither likely nor unlikely
    4. Somewhat unlikely
    5. Extremely unlikely

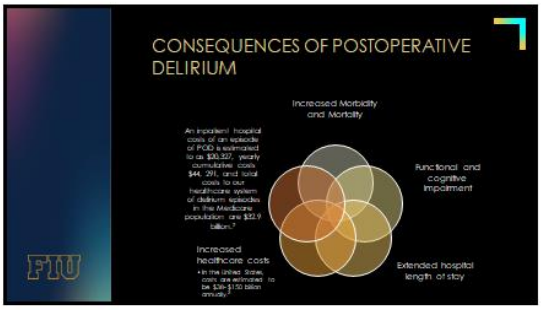
Appendix I: DNP Symposium Presentation











ADDRESSING THE PROBLEM

- There is no current "gold standard" guideline for the prevention of POD.
- Numerous studies have indicated specific medications and polypharmacy associated with the development of delirium.

Utilization of benzodiazepines in the elderly will increase the likelihood of developing POD.

Melatonin is hypothesized to be a safe treatment option.

Exogenous Melatonin benefits include regulation of circadian rhythm, improved sleep, and mood, anxiolysis, anti-inflammatory, analgesic, and oncostatic.

RESULTS OF SYSTEMATIC REVIEW

- An intervention group received Melatonin 3mg and evaluated using the Confusion Assessment Method tool on the day of surgery compared to 3 days after.
  - In elderly patients elderly undergoing open-heart surgery, the incidence of delirium significantly reduced in the Melatonin control group, 35.7% and 5.7% on the day of operation, 68.6% and 31.4% three days after the operation.[1]
- Two groups, undergoing cardiac surgery, received a placebo versus 5mg of Melatonin. The participants received 5 mg of Melatonin the evening before the operation, and the treatment continued until postoperative day 3.
  - Delirium developed in 20.8% of patients from group A and 8.4% of patients from group B, with the difference in the incidence of delirium between the groups being statistically significant.[2]

DNP PROJECT PURPOSE

Literature review:

Using RCTs and comparing melatonin and midazolam to enhance provider for reducing postoperative delirium in the elderly.

Educational module:

To present an educational module to anesthesia providers about the benefits of exogenous melatonin over midazolam, for the prevention of postoperative delirium in the elderly

PICO QUESTION

In elderly patients, would the use of Melatonin versus Midazolam decrease postoperative delirium or cognitive dysfunction?

QUALITY IMPROVEMENT METHODS

Anesthesia providers at a large acute-care facility in Miami, Florida.

- IRB approval requested and granted from FIU and acute care facility
- Anonymous email sent to providers with link to Qualtrics containing pre and post questionnaires and the online educational module.
- A voiceover powerpoint was utilized to present the educational module.
- Data generated via Qualtrics questionnaires were exported to compare the pre and posttests.

RESULTS

Participants (n = 8)	Number	Percentage %
Gender		
Male	1	12.5
Female	7	87.5
Ethnicity		
Caucasian	1	14.29
Hispanic	3	42.86
African American	2	28.57
Other	1	14.29
Position		
CRNA	8	100
Level of Education		
MSN	2	25
DNP	6	75
Years of Experience		
0-2	2	25
3-5	2	25
5-10	2	25
Over 10	2	25

RESULTS

DEMONSTRATES THE PARTICIPANTS PRETEST AND POSTTEST RESPONSES TOWARDS ATTITUDES ABOUT MELATONIN VERSUS MIDAZOLAM AND POSTOPERATIVE DELIRIUM IN THE ELDERLY.

Questions	Pretest	Posttest
Please indicate your level of agreement with the following statement: As an anesthesia provider, your clinical anesthetic technique can assist in decreasing the negative outcomes of postoperative delirium in the elderly population.	Strongly agree 37.5% Agree 37.5% Neutral 0% Disagree 12.5% Strongly disagree 12.5%	Strongly agree 62.5% Agree 25% Neutral 12.50% Disagree 0% Strongly disagree 0%
Please indicate your level of agreement with the following statement: It is important to use anesthetic techniques to reduce the incidence of postoperative delirium in the elderly.	Strongly agree 37.5% Agree 12.5% Neutral 25% Disagree 12.5% Strongly disagree 12.5%	Strongly agree 62.5% Agree 0% Neutral 12.5% Disagree 12.5% Strongly disagree 12.5%

RESULTS

SEVEN SURVEY QUESTIONS TESTED THE PARTICIPANTS' KNOWLEDGE REGARDING MELATONIN, MIDAZOLAM, AND POSTOPERATIVE DELIRIUM

Questions	Pretest	Posttest
Postoperative delirium arises upon emergence and through postoperative days one to three?	87.50%	100%
Which of the following is NOT a consequence of postoperative delirium?	50%	71.43%
Elderly patients undergoing high stress surgeries are at the highest risk of developing postoperative delirium.	50%	62.50%
Benefits of Melatonin include which of the following?	62.50%	80%
Melatonin is secreted by the pineal gland and high levels closely resembles:	62.50%	80%
The use of Midazolam in advance age has been linked to:	75%	75%
Postoperative delirium is thought to be caused by oxidative stress, immune activation, and neurotransmitter imbalance?	50%	75%

IMPLEMENTATION RESULTS

Question	Pretest	Posttest
How likely are you to utilize Melatonin in your practice?	Extremely likely 12.5% Somewhat likely 50% Neither likely nor unlikely 12.5% Somewhat unlikely 0% Extremely unlikely 12.5%	Extremely likely 25% Somewhat likely 37.5% Neither likely nor unlikely 25% Somewhat unlikely 12.5% Extremely unlikely 0%

DISCUSSION

Limitations

- Forty participants who belong to the anesthesia group received the distribution survey via e-mail.
- Eight people participated and completed the entire module.
- A small sample size is a limitation of this project.
- The survey could be distributed to more participants within multiple acute hospital systems to increase the sample size.
- One participant opened the survey but never completed the entire module. An incomplete could have impacted the final results.

YA1

DISCUSSION

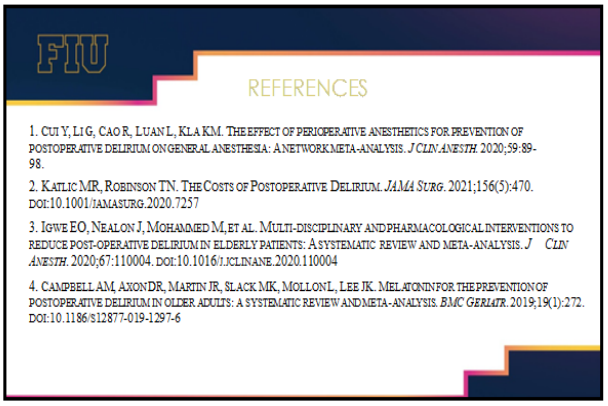
- Implications for Anesthesia Practice
- Postoperative delirium is a relevant issue in the elderly population.
- After completing the educational intervention, the quality improvement project demonstrated an increased knowledge of Melatonin and its effect on reducing the incidence of postoperative delirium.
- Participants improved their attitudes towards their role and preventative techniques or strategies for preventing postoperative delirium.
- Participants reported implementing Melatonin for elderly patients to prevent postoperative delirium. Results suggest that participants will modify their anesthetic plan by adding Melatonin to improve postoperative outcomes in the elderly.

CONCLUSION

THE DEVELOPMENT OF POD IS MULTIFACTORIAL: MULTIPLE COMORBIDITIES, AGE GREATER THAN 70, HISTORY OF FALLS, ALCOHOL USE, AND COGNITIVE OR FUNCTIONAL DECLINE. UNFORTUNATELY, POOR OUTCOMES ARE IDENTIFIED AS A BURDEN TO OUR HEALTHCARE SYSTEM: INCREASED HEALTHCARE COSTS, INCREASED LENGTH OF STAY, FUNCTIONAL DECLINE, AND HIGHER MORTALITY RATES.

THE EDUCATIONAL MODULE ON MELATONIN VERSUS MIDAZOLAM AND POSTOPERATIVE DELIRIUM CAN ENHANCE A PROVIDER'S KNOWLEDGE, INCREASE THEIR ATTITUDES AND INCREASE THE IMPLEMENTATION OF EXOGENOUS MELATONIN IN THE ELDERLY POPULATION FOR IMPROVING QUALITY CARE AND IMPROVE PATIENT OUTCOMES.


FIU
THANK YOU
DR. YASMINE CAMPBELL DNP, CRNA, APRN, CNE
TO ALL PARTICIPANTS IN THIS PROJECT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